REMARKS

In the Office Action dated September 25, 2002, the Examiner noted that page 380 of the article by Waterbeemd et al., submitted as Reference AU with the Information Disclosure Statement filed May 14, 2001, was missing page 380. The Examiner stated the reference will be considered if a copy of this page is submitted, and accordingly Applicants submit a further complete copy of the Waterbeemd et al. reference, which includes page 380.

Claims 1-15 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for the reasons set forth in Section 3 on page 2 of the Office Action.

The Examiner stated in claim 1, the phrase "said fluorescent layer... with a density which is reduced in comparison to a density which said fluorescent material has a solid" is unclear because the fluorescent material is a solid. The Examiner stated the phrase appears to refer to the phenomenon that cracks (i.e. voids) exist between the claimed needle structures, and the Examiner stated that the presence of cracks or separations between needles, columns, or pillars of phosphor layers, which the Examiner characterized as being known in the cited prior art references, has been interpreted as meeting this claim limitation.

As discussed in more detail below, Applicants acknowledged in the original specification that gaps or voids between the needle structures of a needle-like fluorescent layer are known to exist in conventionally generated fluorescent layers. Such gaps or voids between the needle structures also exist in the fluorescent layer produced in accordance with the inventive method, and therefore these gaps or voids will contribute to the fact that the fluorescent *layer* has a density which is less than the density of the fluorescent *material* itself. As explained in the present

specification, however, such as in the paragraph beginning at page 4, line 9, the inventive method controls the vapor deposition so that lattice defects are intentionally produced in the fluorescent layer. In the inventive method, therefore, it is a combination of the (conventional) voids or gaps between the needle structures, and the intentionally produced lattice defects, which results in the fluorescent layer having a density that is reduced compared to the density of the fluorescent material itself. Claim 1 has been amended to specifically identify how the reduced density is achieved in the inventive method by making reference both to the aforementioned voids or gaps, and the lattice imperfections.

Claim 2 has been amended consistent with the specification as originally filed to state that the density is reduced by 5-50% of the density of the solid fluorescent material.

Claim 5 has been amended to delete the word "said" preceding "inert gas" and therefore the inference that "inert gas" has been previously introduced into claim 5 or an earlier claim is voided.

An editorial amendment has been made to claim 7, which is discussed below.

All claims of the application are therefore submitted to be in full compliance with all provisions of 35 U.S.C. §112, second paragraph.

Claims 1, 3-6 and 8-15 were rejected under 35 U.S.C. §102(b) as being anticipated by Goodman et al.

As discussed above, Applicants acknowledge that conventionally produced fluorescent layers with a needle structure have gaps or voids between the needles. The Goodman et al. reference is an example of the production of such a known fluorescent layer. The Goodman et al. reference does teach producing a

luminophore layer having a needle structure with a density that is reduced compared to the density of the luminophore material itself, however, this is achieved solely by adjustment or control of the gaps or voids between the needles. There is no teaching whatsoever in Goodman et al. to control or adjust the density of the luminophore layer by intentionally introducing lattice imperfections into the layer by controlling the vapor deposition thereof, as disclosed and claimed in the present application. In fact, the Goodman et al. reference provides explicit teachings to the contrary, since the Goodman et al. reference teaches at column 1, lines 57-61 that the crystals of the luminophore layer should be uniform. This is a teaching away from intentionally introducing lattice imperfections, since this would result in non-uniform crystals.

In view of the aforementioned amendment to independent claim 1, wherein the reduced density is explicitly stated to arise from a combination of the gaps or voids between the needle structures, and the lattice imperfections produced by controlling the vapor deposition, the Goodman et al. reference does not disclose all of the method steps as set forth in claim 1, and therefore does not anticipate any of claims 1, 3-6 or 8-15.

Claims 1-15 were rejected under 35 U.S.C. §102(e) and 35 U.S.C. §102(f) as being anticipated by United States Patent Application Publication US 2001/0007352. The Examiner specifically cited Figures 1 and 7 paragraphs [0016] - [0018].

The above comments relating to the Goodman et al. reference apply as well to the rejections based on this published application. It is clear from the paragraphs cited by the Examiner, as well as from paragraph [0015], that the teachings of this published application are that a defined needle structure should be produced. There

is no discussion of lattice imperfections in this published application, and there is no teaching to control the vapor deposition to introduce lattice imperfections into the fluorescent layer so as to adjust or control the density thereof relative to the density of the solid material comprising the fluorescent layer. Therefore, the published application does not disclose all of the method steps of claim 1 as set forth in that claim, and therefore the published application does not anticipate claim 1 nor any of the claims depending therefrom, under either §102(e) or §102(f).

Claim 2 was rejected under 35 U.S.C. §102(a) as being unpatentable over Goodman et al. in view of Tran et al. The Examiner referred to Figures 2 and 3 of the Goodman et al. reference as showing small areas of crack volume while Figures 4 and 5 show significant areas of void volume. The Examiner relied on the Tran et al. reference as teaching that it is possible to widen the cracks (i.e. increase the void volume) by annealing.

Widening the cracks, however, is not the same as, and is not understood by those of ordinary skill as being the same as, introducing lattice imperfections into the fluorescent layer, for the purpose of adjusting the density thereof, as disclosed and claimed in the present application. As can be seen by comparing Figure 2 of the present application to the cited Figures 2 and 3 of the Goodman et al. reference, the lattice structure in the Goodman et al. reference remains intact, whereas it has been distorted by imperfections in the subject matter of the present application.

Therefore, even if the cracks in the fluorescent layer of Goodman et al. were widened by annealing in accordance with the teachings of Tran et al., this still would not result in a method comparable to the method of claim 2, which incorporates the subject matter of claim 1 therein. Claim 2 therefore would not have been obvious to

a person of ordinary skill in the art under the provisions of 35 U.S.C. §103(a) based on the teachings of Goodman et al. and Tran et al.

Claim 7 was rejected under 35 U.S.C. §`103(a) as being unpatentable over Goodman et al. in view of Noji et al. The Examiner stated the Goodman et al. reference teaches controlling the pressure of argon introduced into the manufacturing process, but the Examiner acknowledged that the Goodman et al. reference does not explicitly teach that the pressure is controlled by passing the argon past a baffle, as set forth in claim 7. The Examiner characterized a "partially closed valve" as representing a baffle.

First, it is not clear why the Examiner included the concept of pressure control in the rejection of claim 7, since none of claim 7 nor claims 4, 3 and 1, from which claim 7 depends, refer to the use of a baffle for pressure control. Nevertheless, even a partially closed valve as disclosed in the Noji et al. reference does not satisfy the method step of claim 7 of diverting the inert gas with a baffle. A partially closed valve may increase or reduce the volume of inert gas and thus the pressure and/or flow associated therewith, but it does not divert the inert gas. Nevertheless, claim 7 has been editorially amended to make clear that the inert gas is diverted relative to the vapor jet, and that this is for the purpose of causing the inert gas to be indirectly introduced into the vapor jet. No such teaching is present in either the Goodman et al. or the Noji et al. references, and therefore the subject matter of claim 7 would not have been obvious to a person of ordinary skill in the art based on the teachings of those references.

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

Submitted by,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please amend claim 1 as follows:

1. (Amended) A method for forming fluorescent layers on a substrate, comprising the steps of:

vapor depositing a needle-shaped fluorescent layer having needle structures with voids therebetween, composed of fluorescent material, on a substrate; and

controlling vapor deposition of said fluorescent layer so that said fluorescent layer is deposited on said substrate with lattice imperfections therein, giving said fluorescent layer a density which is reduced, due to said voids and lattice imperfections, in comparison to a density which said fluorescent material has as a solid, to produce a needle-shaped fluorescent layer with optical separation between needle structures.

Please amend claim 2 as follows:

2. (Amended) A method as claimed in claim 1 comprising controlling said vapor deposition to reduce said density of the fluorescent layer by between 5% to 50% of said density that said fluorescent material has as a solid.

Please amend claim 5 as follows:

5. (Amended) A method as claimed in claim 3 wherein said vapor jet is produced in a vapor-deposition apparatus, and comprising introducing [said] inert gas into said vapor deposition apparatus at a gas pressure below 10 Pa.

Please amend claim 7 as follows:

7. (Amended) A method as claimed in claim 4 comprising diverting said inert gas relative to said vapor jet with a baffle before introducing said inert gas into said vapor jet, causing said inert gas to be introduced indirectly into said vapor jet .

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